

## HEMORRHAGE IN THE VIABLE PERIOD OF PREGNANCY \*

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VAGINAL bleeding, at any period of pregnancy, is abnormal although it is recognized that there may be some staining in the very early months of pregnancy at the time of the normally expected menstrual period. This may be physiological, before the formation of the placenta. Any bleeding thereafter is abnormal and requires prompt investigation.

I shall confine my remarks, this afternoon, to the management of bleeding during the so-called viable period of pregnancy.

For statistical purposes, the United States Bureau of Census has adopted three criteria for determining the viability of the fetus: (1) 28 weeks, or more, of gestation, (2) a fetus 1500 grams, or more, in weight, (3) a fetus 35 centimeters, or more, in length. It is rare for a baby, not possessing at least two of the above criteria, to survive. There are rare instances in which gestation is apparently slightly less than 28 weeks, or in which the child does not come up to the specifications of weight and length, and yet, with excellent obstetric and pediatric care, including the use of modern incubators and special premature nurseries, such a child has survived.

In 1933 a report on Maternal Mortality in New York City was published by The New York Academy of Medicine, under the auspices of the Committee on Public Health Relations. This report indicated that the maternal mortality rate for New York City was approximately 57 per 10,000 living births. At that time this Committee stated that at least two-thirds of all maternal deaths were preventable. The factor of preventability was assigned to error in judgment or error in technique on the part of the physician or midwife in approximately two-thirds of all maternal deaths. In approximately one-third of the cases, preventability was charged directly to the patient in not seeking or accepting proper obstetrical care.

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Following this report, the Medical Society of the County of New York appointed a Special Committee on Maternal Welfare. I have been a member of this Committee since its formation and, for the past several years, have been privileged to serve as its Chairman. The function of this Committee is to secure and analyze all data relative to ante partum, intra partum and post partum management of all deaths occurring in the viable period of pregnancy.

During the intervening years, I am happy to report, there has been a steady decline in the maternal mortality rate in New York City, and also, that similar Committees are functioning in many of the larger cities and in other less thickly settled districts.

The United States Bureau of Census files, for the year 1929, reported 77 mothers lost per 10,000 live births. In 1944, the United States Bureau of Census files showed a maternal loss of 23.3 per 10,000 live births. And in the same year, the Bureau of Records of the Department of Health for New York City recorded 124,395 deliveries (at 28 weeks of gestation, or over) with 165 puerperal deaths among women who had reached the 28th week of pregnancy. This represents a mortality rate of 13.3 per 10,000 births in the viable period of gestation for New York City. Since the maternal death rate for New York City is not computed on an identical basis with the Census Bureau figures, absolute comparison must not be made. However, a definite trend toward a lowered maternal mortality is evident.

In general, this lowering of maternal mortality in the United States has been due to the marked lessening of death caused by sepsis and the toxemias of pregnancy. In 1943 the Bureau of Census showed, for the first time, that hemorrhage was the major cause of maternal death in the U.S.A. For a number of years hemorrhage had been the major cause of death in New York County, and is still a major, or contributing factor in at least one-half of all obstetrical deaths in New York County.

It is gratifying to note, however, that hemorrhage is being more promptly and adequately treated, largely due to the coöperation and the facilities of the Blood and Plasma Exchange, with its various branches located in the hospitals of New York County. It is still unfortunate that a number of mothers do not avail themselves of the existing facilities for proper prenatal and intra partum care, and it is also unfortunate that obstetricians have not more promptly and completely utilized the excellent facilities of the Blood and Plasma Exchange.

Although the maternal death rate for New York City, during the year 1944, was considerably less than one-third the maternal death rate in 1933, we must concede that it is possible to reduce still further this maternal loss, especially in cases due to hemorrhage. I believe it is fair to say that the greater number of hemorrhagic deaths are preventable, if prompt and adequate measures are taken. I do not consider that all hemorrhagic deaths are preventable.

Vaginal bleeding, occurring at any time during the viable period of pregnancy, requires most careful consideration. Under ideal conditions the bleeding patient should be placed under the supervision of a well trained physician or obstetrician, preferably in a well equipped obstetrical department of a hospital. Minor degrees of bleeding may require no further treatment and the cause itself, whether from cervical erosion, rupture of small varicosities in the genital tract or excess activity on the part of the patient, may be in doubt.

The more serious types of bleeding may be due to: (1) cervical lesions, such as excessive erosions, or malignancy, or, more rarely to a ruptured varicose vein, (2) placenta previa, (3) premature separation of the normally situated placenta, (4) trauma from delivery, with lacerations of the vagina, cervix, or rupture of the uterus, (5) post partum hemorrhage due to uterine atony, fibroids, etc.

Preparation for the control and complete management of the bleeding patient is of prime importance. As soon as the patient presents herself for ante partum care, she should be given a complete physical examination and, in addition, blood should be taken for Wassermann test, hemoglobin content (if this is below 70 per cent a red blood cell count should be made) and the blood should be typed, as to the blood group, and an Rh factor determination should be made. If blood replacement becomes necessary at any time in a mother who is Rh negative, she must receive Rh negative blood. Much valuable time will be saved if the type and Rh factor of the patient is known, prior to the need for transfusion.

Examination for the determination of the cause of bleeding should, of course, be performed under sterile precautions.

#### CERVICAL LESIONS

Bleeding from cervical erosions, or small ruptured varicosities of the cervix during pregnancy, usually requires no treatment beyond rest or

occasional packing or superficial electro-coagulation. Suspicious areas of erosion require biopsy to exclude malignancy. If malignancy of the cervix is found during the viable period of pregnancy, that pregnancy should be terminated as soon as possible, since it is well known that gestation hastens the growth and spread of the malignant process. Delivery of a viable baby through such a cervix is dangerous. The baby should be delivered by abdominal caesarean section, preferably of the Porro type. The amputation of the uterus should be above the bladder fold of peritoneum and without displacement of the bladder. In from four to six weeks the cervical carcinoma can be treated, in the usual manner, by radium and/or x-ray therapy.

#### PLACENTA PREVIA

Placenta previa is one of the major causes of serious hemorrhage in the viable period of pregnancy. The incidence of this condition is probably about one in two hundred deliveries. In the larger obstetrical services this incidence is somewhat greater. The maternal mortality rate in this condition has been stated to be 10 to 20 per cent. In recent years, however, this has been markedly decreased, especially in the larger obstetrical clinics. A review of the literature would indicate that maternal mortality attributable to placenta previa in the past ten years is approximately 3.6 per cent.

The earliest intimation of placenta previa is painless bleeding. This may be a mere spotting or a profuse hemorrhage. Painless bleeding of even minor degree is a danger signal and should not be disregarded. Any bleeding in the last trimester of pregnancy is abnormal. Vaginal examination under home conditions and without proper facilities to combat hemorrhage and carry out proper treatment is dangerous. The patient should be hospitalized immediately so that sterile vaginal examination, on which final diagnosis depends, may be safely made. This examination should be made only after all is in readiness to control hemorrhage and to carry out the proper method of delivery, the only exception to this rule being profuse vaginal bleeding which may be controlled temporarily at least by vaginal tamponade, preferably with heavy iodoform gauze packing. Upon admission, the patient should be immediately prepared for delivery either vaginal or abdominal. During this time she should have a complete blood count, including a cross matching and Rh factor determination. A suitable, compatible donor or compatible

bank blood should be immediately available in the operating or delivery room. Meanwhile, the patient should receive supportive treatment with pooled plasma, glucose or saline solution, if needed. Rectal examination is unreliable, inconclusive and frequently more traumatic. The risk of increased hemorrhage and possible sepsis involved in vaginal examination has led to the use of x-ray as an aid in the diagnosis of placenta previa. Many obstetricians are still somewhat skeptical of the accuracy of this method. It appears to be particularly valuable in ruling out premature separation simulating placenta previa. Absolute certainty of diagnosis in placenta previa is obtained only from vaginal examination, when the placenta may be felt in the lower uterine segment. The placenta may completely cover the os uteri or may partially cover it. In the less complete type, the edge of the placenta may be felt on the lateral surface of the lower uterine segment when the examining finger is inserted through the cervical canal. Active treatment should be instituted only after the actual diagnosis is made. From the standpoint of treatment, there are two types of previa. Either the placenta covers the os (central or complete previa) or it does not (incomplete, partial or lateral previa). The degree of previa, whether complete or partial, will vary with the time of the examination and the relative dilatation and retraction of the cervix.

In the so-called complete or central previa, there is little disagreement as to the method of treatment, this method being delivery by the abdominal route, some obstetricians favoring the classical caesarean while others adhere to the low flap type of operation. Obstetricians who favor the classical caesarean in cases of central placenta previa apparently do so on the grounds that the incision in the fundus avoids the placental site and thereby lessens blood loss at the time of operation. Other obstetricians favor the low flap type of caesarean on the grounds that the incision can frequently be made above the edge of the placental insertion, or if this is unavoidable, that the hemorrhage caused thereby is rarely excessive. It is a well known fact that the low flap type of caesarean section has a lower mortality rate than the classical section. A study of caesarean section mortality from all parts of the country covering thousands of cases clearly indicates that the mortality rate in the low flap type caesarean is approximately one-half or less than one-half the mortality rate in the classical caesarean section. This is true in all groups of caesarean sections including caesarean sections

done in cases of placenta previa.

When the placenta previa is not complete (probably two-thirds of all cases) opinions as to the method of treatment show considerable variation. An analysis of the literature in the past ten years indicates that two methods of treatment have given the best prognosis for mother and child. These methods are: (1) Simple rupture of the amniotic sac (and await the normal process of labor and delivery per vagina) or, (2) Abdominal delivery by caesarean section. The choice of method will be determined by the individualization of each case indicating to the trained obstetrician the proper method to be chosen. This selection of the method of treatment and delivery should be made at the time of vaginal examination. From this moment on, active treatment should be decisive and prompt. The general condition of the patient (anemia, parity, etc.) and the viability of the fetus are two important factors aside from the type of previa present. There is no expectant treatment of placenta previa. This rule, however, like all others in medical or surgical therapy, is subject to a somewhat liberal interpretation under the careful supervision of a trained obstetrical surgeon. For example, an elderly primigravida, having only slight spotting without labor and the fetus not yet certainly viable, might be given expectant treatment. This treatment being continued hospitalization, supportive treatment if indicated and with everything in readiness for prompt, active treatment should this become necessary.

All types of accouchement forcé are unqualifiedly condemned in the treatment of placenta previa. In the management of this condition the essentials in all cases are to stop the bleeding and empty the uterus as quickly as is consistent with the least contamination, shock or trauma. We must salvage the mother at all costs and the child also, if this is possible and the child is viable.

Other methods of treatment and delivery are extensively used in many of our clinics—Braxton Hicks' version, hydrostatic bag (followed either by forceps or internal podalic version), breech extraction, Willett's forceps or vaginal tamponade during dilatation. None of these methods is free from danger and none has given the low mortality rate, both to mother and child, that has been obtained by the simple rupture of the membranes or delivery by caesarean section. The time of treatment in placenta previa is of paramount importance. Hemorrhage occurs during the stage of cervical dilatation and retraction. This hemorrhage

can be controlled in the great majority of cases by any one of the many methods mentioned or now in general use, the fact being that maternal deaths rarely occur before the delivery of the child since, by any of the methods described, pressure is exerted against the abnormally situated placenta and acts as a tampon to control hemorrhage.

However, when the uterus has been emptied of the child and the placenta, there is a very great tendency to profuse blood loss. The placenta having been attached to the thinned non-contractile lower uterine segment, bleeding continues from the placental site even though the fundus may be well contracted.

In our clinic, we have based our treatment on the avoidance of cervical dilatation and retraction and have found that blood loss, both before and after the emptying of the uterus, is greatly lessened. This avoidance of cervical dilatation can be accomplished only by early caesarean section. If the diagnosis of placenta previa is made, after the cervix is well advanced in dilatation and retraction, particularly in a multipara with a partial or lateral previa and a baby of questionable viability, then vaginal delivery might be chosen, the method of treatment being simple rupture of the membranes allowing the presenting part to descend and make pressure on the placental site.

It has been our practice to insert a tight uterine tamponade in practically all cases of placenta previa immediately following the emptying of the uterus, either from above or below.

#### PREMATURE SEPARATION OF THE NORMALLY SITUATED PLACENTA

Separation of the placenta from its implantation in the uterine wall results in hemorrhage, either concealed (when there is no escape of blood from the cervix) or manifest (when the blood does escape from the cervix). The incidence of premature separation of the placenta, as determined from a review of the literature, indicates a wide variation since many authors include only the two more severe types, such as *ablatio placentae*, while others include all degrees of premature separation, many of which are diagnosed only at delivery when there may be an unusual amount of old blood clot found behind the placenta. If all degrees are included, the incidence is approximately one in 150 to one in 200 deliveries, the more severe types accounting for probably less than one-third the total number.

External bleeding may or may not be an early sign of premature separation of placenta. As the condition progresses there is increased uterine tension causing pain. With the increased retroplacental accumulation of blood, the uterus becomes irritable, the contractions continue until, in the fully developed ablatio placentae, the uterus assumes complete tonicity. Pain is continuous and there is no relaxation of the uterine contraction. The patient may show shock out of proportion to the visible blood loss. Some of the more severe cases of premature separation of placenta show little or no external bleeding until late in the management of the condition. A review of the literature for the past ten years indicates a maternal mortality ranging from 5 to 10 per cent although many larger clinics are able to show a maternal loss of not over 3 per cent. Undoubtedly all maternal loss from this condition occurs in the group of extensive premature separation. This group would include not more than one-third of all cases classified as having premature separation of placenta.

Vaginal bleeding or uterine tonicity and pain are indications for prompt hospitalization. The severity of the symptoms, pain, shock, tonicity of the uterus, the parity of the patient and the evidence of hemorrhage, either concealed or manifest, will determine the method of treatment. In the mild cases, expectant treatment under constant hospital supervision is the method of choice. In all cases, however, the patient should be prepared for delivery, either vaginal or abdominal. Supportive treatment with plasma, glucose or saline should be given as indicated. Complete blood count should be done and all preparations made for the replacement of blood when needed. Repeated blood counts and blood pressure readings, pulse rate, etc. will indicate the progress of the condition. A compatible blood donor or bank blood must be immediately available in the hospital. Sedation with opiates for the control of pain is definitely indicated. The obstetrician, however, must be constantly on the alert that he be not lulled into a false sense of security from the apparent improvement of the patient due only to the relief of pain, while the underlying causes with increasing hemorrhage and infiltration of the uterine musculature become progressively more severe. In many of the milder cases of premature separation of placenta the area is small and does not progress. Frequently, there is a moderate loss of blood and the uterus shows some evidence of irritability but does not become tonically contracted. Symptoms may completely sub-



side or labor ensue without further complication. In those cases in which there is a definite progress of symptoms with increasing pain, shock, uterine tonicity or evidence of blood loss, promptly active treatment is imperative. The choice of active treatment will depend upon parity of the patient, the condition of the cervix, as to its retraction, dilatation and consistency, and the condition of the baby, as to its size, viability or possible intra-uterine death.

When the symptoms are increasing or when there is no improvement from the milder symptoms, the indications are to empty the uterus promptly with as little trauma to mother and baby as is consistent with the condition present. If vaginal delivery is chosen, several methods are available:

1. Rupture of the membranes plus the administration of fractional repeated doses of anterior pituitary extract or pitocin and await the progress of labor either spontaneous or with forceps delivery.

2. Rupture of the membranes plus the insertion of a hydrostatic bag with the administration of fractional doses of anterior pituitary extract.

To either of these methods a tight abdominal binder of the Spanish windlass type may be added.

3. Internal podalic version. This has very limited use and must be restricted to the patient with a completely dilated or easily negotiable cervix. It should never be performed in a tonic uterus and if chosen at all should be reserved for the patient with a small and often dead fetus.

It must be further recognized that if vaginal delivery is chosen as a method of treatment in the management of premature separation of placenta, the obstetrician must be constantly in attendance. He must be alert to the physical condition of the patient and able to gauge accurately the progress of labor as well as the condition within the uterus, since hemorrhage may continue beneath the placenta and infiltrate into the uterine musculature with inevitable production of the uteroplacental apoplexy of Courvelaire. In this condition the uterus becomes deep purple, completely tonic, often with tears in the peritoneal surface and extravasation of blood into the peritoneal cavity either through the tears or through the tubes. Such a uterus will not recover and return to normal following delivery.

While these changes are taking place the patient shows increasing shock, evidence of severe anemia and peritoneal irritation. When symptoms are increasing, attempt at vaginal management and delivery must

be abandoned and abdominal delivery carried out at once in the interests of the mother. Under such conditions the child in all probability is already dead, although if abdominal delivery is selected promptly fetal salvage may still be possible.

The failure of labor to be initiated or to progress satisfactorily has led many obstetricians to select abdominal delivery as a method of choice in an increasing number of cases of premature separation of placenta. This is particularly true in primigravidas or in all cases in which the baby is viable and living when the patient presents herself for treatment.

In many cases the cervix is thick, firm and undilated, hence not favorable for the prompt induction of labor and vaginal delivery. There is a great increase of fetal loss and often progressive blood loss in the mother together with infiltration and destruction of the uterine musculature during this waiting period. The general condition of the patient becomes progressively worse and the risk of delivery whether vaginal or abdominal increases proportionately. For these reasons our clinic has selected prompt abdominal delivery in all the more severe cases of premature separation of placenta and in many of the less severe but definite cases of premature separation especially in the primigravidas or in the multipara in whom the cervix seems unfavorable for prompt induction of labor and vaginal delivery. No method of delivery should be attempted until the mother has recovered sufficiently from shock through the administration of glucose, plasma and blood as indicated, and with opium or its derivatives for the control of pain. In many cases there is marked tendency to hemorrhage following emptying of the uterus either from above or below. This hemorrhage can usually be controlled by the routine use of anterior pituitary extract and ergotrate administered intramuscularly or intravenously. Tight uterine tamponade with heavy iodoform gauze is efficacious in most instances.

If, however, all attempts to control the hemorrhage fail, no time should be lost in performing a prompt abdominal hysterectomy, the patient being supported by repeated blood transfusions. As in placenta previa, blood transfusion, not only during but following delivery, is of paramount importance. The obstetrical surgeon must realize that continued blood loss and prolonged shock place the patient in such a depressed and critical condition that recovery becomes impossible, in spite of blood replacement. In these tragic cases the obstetrician must

make an important decision. If hysterectomy is to be done, it must be performed before the patient is depleted and in severe shock. Maternal life will be saved by the courageous surgeon who places a higher valuation on the life of the mother than upon the conservation of the uterus for possible future childbearing.

In our clinic, hysterectomy has been reserved for a small group of cases in which there was a severe type of uteroplacental apoplexy of Courvelaire or for cases in which there was uncontrollable hemorrhage following the emptying of the uterus. If the uterus shows ability to contract after it has been completely emptied, even though there is considerable infiltration of the uterine musculature with blood, the uterus will recover completely and may be safely retained. Several instances are recorded in which the mother has had subsequent pregnancy and delivery of a living child, usually by repeated caesarean section.

#### LACERATION OF BIRTH CANAL AND RUPTURED UTERUS

Hemorrhage due to laceration of the birth canal manifests itself usually immediately following the birth of the child. Such hemorrhages may be of a very minor degree and easily controlled by prompt repair. These hemorrhages may follow normal spontaneous labor and spontaneous delivery. Instrumental delivery, version and breech extraction or any of the more difficult types of vaginal delivery predispose to birth canal injury with its subsequent hemorrhage. The best treatment of hemorrhage from birth canal injuries is prevention. No vaginal delivery should be attempted until the cervix is fully dilated and retracted. Instrumental delivery must not be attempted until the head is engaged in the pelvis. No method of vaginal delivery should be attempted until the obstetrician is convinced that major disproportion between the fetus and the maternal birth canal does not exist. An accurate diagnosis as to presentation and position of the presenting part is an essential requisite before operative vaginal delivery is attempted. During her labor, the mother must have been properly supported and prepared by the maintenance of fluid intake, preferably by the intravenous route, and by blood transfusion, in those patients in whom marked anemia exists at the onset of labor. Manual dilatation of the cervix or incision of the cervix carries grave risk of hemorrhage post partum. These procedures have been discontinued by many obstetrical clinics. If done at all, they

must be done only after careful review of all the factors involved. Under these conditions the patient must, of course, receive prompt supportive treatment, blood replacement and shock therapy. Further operative procedures should be carried out only after the patient has responded to these measures.

Following the emptying of the uterus, if there is unusual bleeding, a complete exploration of the birth canal is indicated. Proper delivery room equipment with an adequate delivery table, proper lighting facilities and instruments for exposure of the genital canal are prime requisites. Under strict aseptic precautions the perineal area is carefully inspected and all damage noted. The cervix should be fully exposed and if tears are present these can and should be repaired by suture. Packing is usually inefficient and should be relied upon only when the patient's condition is such that further immediate operative procedures can not be carried out.

Rupture of the uterus, either before or during delivery, may manifest only minor external bleeding while there is evidence of blood loss and shock out of proportion to the external bleeding. The best treatment for rupture of the uterus, as in other childbirth injury, is prevention. Patients who have had extensive operations on the uterus from previous myomectomies, previous caesareans, etc. should not be allowed to undergo the strain of labor. The dictum, "Once a caesarean, always a caesarean," is probably an excellent one. It is possible, however, that previous caesareans may have been done for placenta previa in women who have an adequate pelvis with no obstruction in the soft parts and without fetal disproportion. Under careful supervision of labor and with a favorable soft cervix, the presenting part well in the pelvis and a short labor, vaginal delivery may be indicated.

Prolonged labor without definite progress and advancement of the presenting part resulting in a thinning of the lower uterine segment and a formation of so-called Bandl's ring predisposes to rupture of the uterus. The use of oxytocic drugs, such as anterior pituitary substance, to hasten the progress of labor and force the expulsion of the fetus is a frequent cause of uterine rupture. The use of oxytocics before the birth of the baby must be undertaken only after the careful evaluation of all conditions present. Many obstetricians forbid the use of oxytocics until the birth of the baby. If used at all, fractional doses repeated only at intervals and for a very limited time are allowable. Oxytocics must

not be used in any labor in which there is even a minor degree of disproportion. They should never be used in the presence of abnormal presentation.

Attempts at operative delivery through an incompletely dilated and retracted cervix are a major contributing factor to extensive cervical laceration and rupture of the lower uterine segment. Version and breech extraction, particularly in the uterus after prolonged ruptured membranes or in a uterus that is tonically contracted, are a frequent cause of uterine rupture. Attempts at instrumental rotation high in the pelvis, particularly, if the cervix is incompletely dilated, may result in rupture of the lower uterine segment.

If uterine rupture is suspected or diagnosed prior to the birth of the child, no attempt should be made at vaginal delivery. Delivery should be accomplished through the abdomen after proper supportive treatment to the mother and with adequate blood and plasma available at operation and post delivery. Many cases of uterine rupture are not diagnosed post delivery, particularly in those cases which show only a small amount of vaginal bleeding. These patients are frequently returned to their beds and in a short time or in a few hours show evidence of shock or blood loss or peritoneal irritation. Frequently these patients receive treatment both too little and too late for maternal salvage. These tragedies could be avoided if careful evaluation of the conditions had been made immediately post delivery. All patients who have had any of the more difficult or complicated vaginal operative deliveries such as instrumental rotation, difficult forceps, face presentation deliveries, version and extraction or breech deliveries or who have had prolonged and difficult labor should have careful immediate post partum examination. As soon as the uterus has been emptied of baby and placenta, careful inspection should be carried out under aseptic precautions and in a well equipped delivery room with all needed equipment available. The freshly gloved hand should explore the genital tract from perineum to fundus. I believe that this exploration should start at the fundus. Particular attention should be given to the lower uterine segment and to the cervix. This should be not only palpated but visualized. If lacerations in the cervix extend deeply into the fornices, these may be repaired by suture and the vagina subsequently tightly packed with iodoform gauze. If lacerations extend deeply into the lower uterine segment or an actual rupture is found in the uterus, the patient should be immedi-

ately subjected to laparotomy. Naturally, this operation should not be made in the presence of shock. The patient must be supported and restored by free administration of blood and plasma. At the time of laparotomy only the more minor degrees of injury to the uterus should be repaired by suture. All more major injuries will necessitate hysterectomy for the control of bleeding and the prevention of infection. Maternal mortality from ruptured uterus has been greatly lessened in all clinics where this apparently more radical treatment has been the method of choice.

#### UTERINE ATONY

Postpartum hemorrhage may occur following an apparently normal delivery, such hemorrhage not being due to trauma in any form. This may occur in the absence of any lacerations. This hemorrhage occurs as a rule shortly after delivery although it may occur later in the puerperium. Uterine fibroids interfering with the proper separation of the placenta or complete contraction of the uterine musculature following delivery, predispose to such hemorrhage. Prolonged labor or inefficient uterine contractions predispose to postpartum hemorrhage. Overdistention of the uterus due to twins or hydramnion may be a factor in postpartum hemorrhage. Incomplete separation of the placenta or retained fragments of placenta are causes of postpartum bleeding. A rare but dramatic cause of postpartum bleeding is puerperal inversion of the uterus. Treatment of these conditions will vary somewhat as to the cause of bleeding. Preventive treatment is of prime importance. Supportive treatment of the mother during delivery, particularly with parenteral fluids, blood and plasma if indicated, help to maintain tonicity of the uterus. The excessive use of various analgesics during labor must be carefully guarded against. Textbooks on obstetrics for many years have taught that the placenta should not be expressed for some time, usually from fifteen to twenty minutes or even one hour following the birth of the baby. It would seem that the placenta is separated much earlier than this and that blood loss is greatly lessened by its prompt removal. Certainly, in all cases following unusual or continued bleeding following the birth of the baby, the placenta and membranes should be removed promptly. Under careful aseptic technique in a well equipped, modern delivery room, manual exploration of the uterus is safe immediately following the birth of the baby. This should always be done if the

placenta is not and cannot be promptly expressed. Many clinics are now using preparations of ergot, such as ergotrate, ergonovine or posterior pituitary extract or a combination of both immediately following the birth of the baby. Some obstetricians give intravenous ergotrate as soon as the shoulders are in the introitus. The contraction which follows this probably separates the placenta along with the birth of the baby. In such instances the placenta is either expressed spontaneously or by a gentle pressure on the fundus. The already separated placenta is easily expressed from the cervix and vagina. Further intramuscular ergotrate preparations tend to maintain the tonicity of the uterus. Forcible attempts to express the placenta, especially if the uterus is not contracted, or traction upon the cord may tend toward inversion of the uterus. When acute inversion of the uterus occurs, there is usually profuse hemorrhage and rapid development of shock in the mother. Under these conditions the placenta has usually been separated and removed and the fundus will be found inverted within the vagina or protruding through the introitus. Prompt supportive measures must be instituted with blood and plasma. If the patient is not in shock, gentle attempts at manual replacement are justified and indicated. Should these attempts fail or increased shock symptoms supervene, attempts at replacement must be abandoned and the bleeding controlled, if possible, by tight tamponade. Increased efforts at combating shock are continued with heat, sedation and blood replacement. When the patient has recovered from her shock, attempts may be made, under anesthesia, to replace the uterus manually per vagina. If successful, the uterus and vagina are then packed. If attempts at manual replacement are unsuccessful, abdominal operation will be necessary for the correction of the condition. This should not be done until the patient is sufficiently recovered and is in condition for the operation. This may be from several hours to several days. In all cases in which there is excessive vaginal bleeding or lacerations or inversion of the uterus, bleeding should be controlled before the patient is returned to her bed. Careful exploration of the uterus, complete manual removal of all placental tissue if needed, and the insertion of tight uterine tamponade usually control this bleeding. There are a number of obstetricians who believe that uterine packing is completely inefficient and may even interfere with the proper contraction of the uterus. These men rely on complete emptying of the uterus and administration of oxytocics. In any event,

the patient must be properly supported with fluids and especially blood and plasma. If, in spite of all attempts to control the postpartum bleeding by the above methods, there is continued blood loss, the obstetrician must make a very important decision. Certainly, blood loss must be stopped. Under such conditions prompt abdominal hysterectomy will save maternal life. Too often this life saving operation is delayed to the point where the mother cannot recover, in spite of sufficient blood replacement and control of hemorrhage.

Bleeding during the puerperium may occur from retained fragments of placenta or from other uterine pathology, such as fibroids and the so-called subinvolution of the uterus. If this bleeding becomes alarming, proper methods must be instituted for its control. Placental fragments should be removed by a careful digital and instrumental curettage. Uterine fibroids rarely may necessitate abdominal hysterectomy. A rare cause of postpartum hemorrhage, namely placenta accreta, will have been determined in the time when the patient is examined because of failure of the expulsion of the placenta. If the placenta accreta is complete no significant bleeding will occur since bleeding occurs only after partial separation. Attempts at manual removal of the placenta indicate that there is no normal plane of cleavage between the placenta and the uterine musculature. Under such conditions, continued attempts to separate the placenta may result in perforation of the uterus by the examining fingers. Apparently hysterectomy is the only safe method of treatment in cases of true placenta accreta. Fortunately, this condition is rare.

In review, it would seem that if we are to reduce maternal mortality due to hemorrhage we should, insofar as is possible, prevent undue blood loss and if in spite of our efforts blood loss is unavoidable, prompt measures for its control and replacement must be available and utilized. During the pregnancy, the mother should be maintained in the best possible physical condition through proper diet, administration of calcium, iron, vitamins and blood transfusion, if necessary, to combat severe anemias. Early in her pregnancy, the patient should have not only a general and obstetrical check-up, she should also have blood Wassermann, blood typing, hemoglobin or red blood cell estimation and Rh factor determination. The patient should carry with her at all times and take with her to the hospital a record of her hemoglobin, Wassermann, blood type and Rh factor. This simple procedure will save



much valuable time and possibly life itself should the occasion arise demanding blood replacement.

Patients in the viable period of pregnancy should have competent evaluation of all factors concerned with labor and delivery. During labor the mother should have proper supportive treatment with parenteral fluids, rest and blood or plasma if necessary. We must seek to avoid unduly prolonged labor. No attempt should be made at vaginal delivery until the cervix is fully dilated and retracted and the obstetrician is convinced that no major disproportion exists. Obstetricians should avoid the indiscriminate and excessive use of analgesics and anesthetics. There must be prompt recognition and investigation of all abnormal bleeding—ante partum, intra partum or post partum with early and complete emptying of the uterus following the birth of the baby. Careful selection of the method of delivery best suited to prevent or control bleeding in the individual patient is essential. Early and competent consultation with a qualified obstetrical surgeon should be sought in all cases of abnormal bleeding. Finally, an efficient and fully equipped delivery room organization, including an adequate supply of blood and plasma immediately available will prevent many maternal deaths now attributed to hemorrhage in the viable period of pregnancy.